CLAIMS

What is claimed:

1. An ophthalmologic instrument intended for measuring the aberrations of the human eye, comprising:

– a point light source which is projected onto the retina of the eye to create a virtual light source on it, the radiation of which is scattered by the retina, then passes through the optical systems of the eye and becomes phase-modulated, the modulation corresponding to the total optical aberrations of the eye;

– a system for measuring the shape of the wavefront of the radiation leaving the eye, the output signal of which is passed to the control system of the instrument;

– a system for compensating for said aberrations, located between the eye and the measuring system and transmitting the radiation leaving the eye, which comprises a refraction compensator that controls focusing the radiation scattered by the retina and an astigmatism compensator located at the image plane of the pupil of the eye;

– a projector of test patterns, which, jointly with said compensators, projects the image of a test pattern onto the retina.

2. The instrument of claim 1, wherein the refraction compensator consists of a movable prism and a dichroic mirror placed between two lenses, said mirror also serving as a beam-splitter used to align the instrument.

3. The instrument of claim 1, wherein the astigmatism compensator consists of two cylindrical or toric lenses of opposite signs, which can be independently rotated around the optical axis of the compensator, and a system for precisely setting the initial turning angles of said lenses.

4. The instrument of claim 1, further comprising a built-in automatic calibration system which uses an additional virtual light source as a test element that allows precisely measuring the current positions of the compensators.

5. The instrument of claim 1, further comprising an alignment system which allows adjusting the proper distance between the eye and the instrument.

6. An ophthalmologic instrument intended for measuring the aberrations of the human eye, comprising:

– a point light source which is projected onto the retina of the eye to create a virtual light source on it, the radiation of which is scattered by the retina, then passes through the optical systems of the eye and becomes phase-modulated, the modulation corresponding to the total optical aberrations of the eye;

– a system for measuring the shape of the wavefront of the radiation leaving the eye, the output signal of which is passed to the control system of the instrument;

– a system for compensating for said aberrations, located between the eye and the measuring system and transmitting the radiation leaving the eye, which comprises a refraction compensator that controls focusing the radiation scattered by the retina, an astigmatism compensator located at the image plane of the pupil of the eye, and a compensator of high-order aberrations;

– a projector of test patterns, which, jointly with said compensators, projects the image of a test pattern onto the retina.

7. The instrument of claim 6, wherein the refraction compensator consists of a movable prism and a dichroic mirror placed between two lenses, said mirror also serving as a beam-splitter required to align the instrument.

8. The instrument of claim 6, wherein the astigmatism compensator consists of two cylindrical or toric lenses of opposite signs, which can be independently rotated around the optical axis of the compensator, and a system for precisely setting the initial turning angles of said lenses.

9. The instrument of claim 6, further comprising a built-in automatic calibration system which uses an additional virtual light source as a test element that allows precisely measuring the current positions of the compensators.

10. The instrument of claim 6, further comprising an alignment system which allows adjusting the proper distance between the eye and the instrument.

11. An alignment system for the instruments of claims 5 and 10, comprising:

– a system for projecting the images of marks onto the iris of the eye, which comprises two identical channels positioned symmetrically with respect to the optical axis of the instrument at a certain angle to it and displaced from it by a certain distance assuring that, when the instrument is properly aligned, the images of the marks combine on the iris to form a crossed circle;

– illumination sources for said projecting system;

– a system for visually observing the mutual positions of the mark images with the aim of determining the direction of the instrument displacement required to set the proper distance between the instrument and the eye, the optical axis of this system lying between the mark projection directions and coinciding with the optical axis of the instrument;

– a system for three-dimensional displacement of the instrument.

12. The system of claim 11, wherein each mark is inclined with respect to the plane orthogonal to the mark projection direction.

13. The system of claim 11, wherein infrared light sources are used for illuminating the eye.

14. A method for aligning the instruments of claims 5 and 10 with the purpose of setting the proper distance between the instrument and the eye, comprising the steps of:

- illuminating the eye;
- projecting the images of marks onto the iris of the eye;
- visually observing the mutual positions of said images;
- three-dimensionally displacing the instrument.